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Integration Of Iot And Cloud Computing-Based Innovation Of Wireless Sensor Network Technology For Health Care Architecture And Agriculture Applications

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ABSTRACT

IoT has advanced in recent years to become some of the most sophisticated technologies of the twenty-first century. Because of less cost computers, big information, cloud technology, embedded schemes, and intelligent technologies, physical objects can interact and collect information with the least amount of human touch. The major purpose of this article is to show how the Internet of Things may be used to a variety of industries such as healthiness care, agriculture, manufacturing, logistics, and transportation. This research focuses on an e-healthiness information collection, transmission, and monitoring system for cardiac patients, in which a wireless sensor network monitors patients' healthiness indicators and transmits information to a remote location through GPRS. This research looks at an autonomous irrigation system for intelligent agricultural applications, in which a device screens earth moisture and waters the plant properly, saving time, water, then labour costs.

Keywords: IoT, healthiness care, agriculture, cloud technology

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1. INTRODUCTION

Kevin Ashton used the period "Internet of Things" to describe source cable organization in 1999. The Internet of Things paradigm is built on the notion of "intelligent," which is described as "the capacity to learn and utilise information autonomously." [1]The Internet of Things refers to a network of "things or devices and sensors" that are self-contained, responsive, distinguished by network configuration, and have intrinsic security (IoT). The Internet of Things is made up of three components: servers, user interfaces, and intelligent devices (nodes) (nodes). The following categories receive information on a regular basis through intelligent sensors and actuators, which gather information from corporeal things, nodes, and their environments on a regular basis [2]. The IP, which links devices and intelligent devices to the stage, allows both end users and service providers to participate in the Internet of Things. When a device or gauging device provides information to the server, the gateway translates the sensor's configuration site into single of the unique IDs. Customers, suppliers, and web or application designers connect with one additional on an IoT stand using user interfaces (UIs) that may be connected or founded on any API [3]. By signing in and utilising the Application Programming Interface to access information as required, the finish user may study and analyse the information that has been uploaded to the cloud, a particular web page, or a phone application in this region. Table 1 lists these organisations and their members [4].

Table 1 main features of IoT

Features	Properties
The sensor and communication	The IP gateway-based sensor and modes of actuators
Medium of communication	Delivery of message, Information management, features of informationbase, security and control
Human machine interface	Visual and special configuration

Several research and endeavours in medical and agriculture have shown to be useful. However, the importance of this study is restricted. A range of literatures are examined and communicated here in order to properly appreciate past notions and endeavours in numerous fields [5]:

A intelligent healthiness monitoring system that monitors a patient's well-being by using a microprocessor, in this instance the ARDUINO UNO, in conjunction with blood pressure and pulse rate sensors. If the nursing system notices any sudden changes in the affected one heart frequency or pressure, it will contact the doctor through mobile announcement, such as GSM. It will also demonstration the patient's blood pressure and heart rate in real time. If the

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person is unable to go to the infirmary, the GPS gadget will assist the medic in position them [6], [7].

The study looks at a variety of Internet of Things (IoT) heath care applications, such as chatbot teleconsultation, investigate, mobile medicine, and researchers and virtual helpers that provide real-time medical information online. The intelligent heath scare model architecture, according to the paper, is a viable solution to the difficulties associated with healthiness care IoT [8].

A microcontroller gadget was utilised in the research to immediately irrigate plants and relay information to agriculturalists. Irrigation is a old practise that often employs a sizable number of agricultural labourers. Microcontrollers, aquatic and moisture devices, and temperature sensors may all be utilised to autonomously irrigate plants. Costs are falling, productivity is increasing, and resource management is improving [9]–[11].

It displays and analyses a wireless cloud-based communication system in order to monitor and control a range of sensors and actuators used to predict plant water demands. The article describes an IoT-based system that uses a variety of real-time information sources. The intelligent irrigation system employs WSN to remotely monitor and manage water drips using a cell phone. Zigbee is a wireless technology that enables sensor nodes and stations to interact with one another. A internet page or application-based operator edge manages and displays real-time observed information on the server [12].

Following the publication of various research publications on the IoT, its characteristics and submissions, IoT for intelligent healthiness care, and IoT for intelligent farming and irrigation, it assists in the growth of in-home prototypes for both intelligent agricultural and e-healthiness information gathering systems.

2. Methodology

"Internet of Things (IoT) in Healthiness Industry Magnitude, Start sharing, and COVID-19 Impact Assessment, By Element (Phones, Apps, and Assistance), By Implementation (Telehealthiness, Concerning The treatment, Processes and Process Managerial staff, Virtual Searching, Specimen Managerial staff, and Many Others), Besides End-User (Research Laboratories, Healthinesscare facilities, Healthiness centres, and Many Others), Besides Geographic Forecast," published by Fortune Using Figures 1 and 2, this is easily understood.

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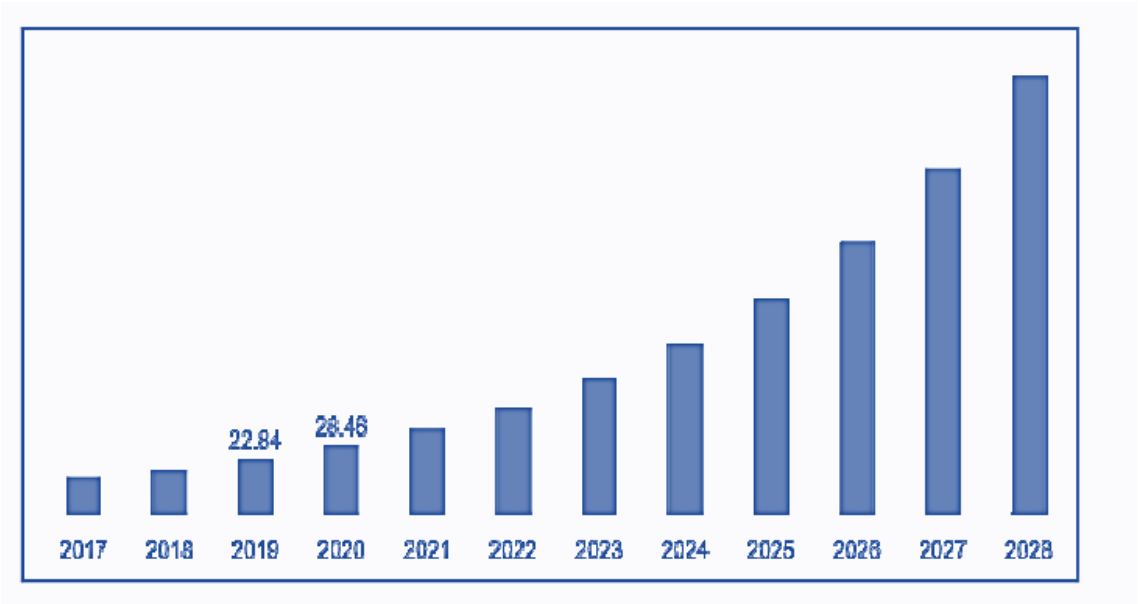

Fig. 1 IoT in the area of healthiness care improvement

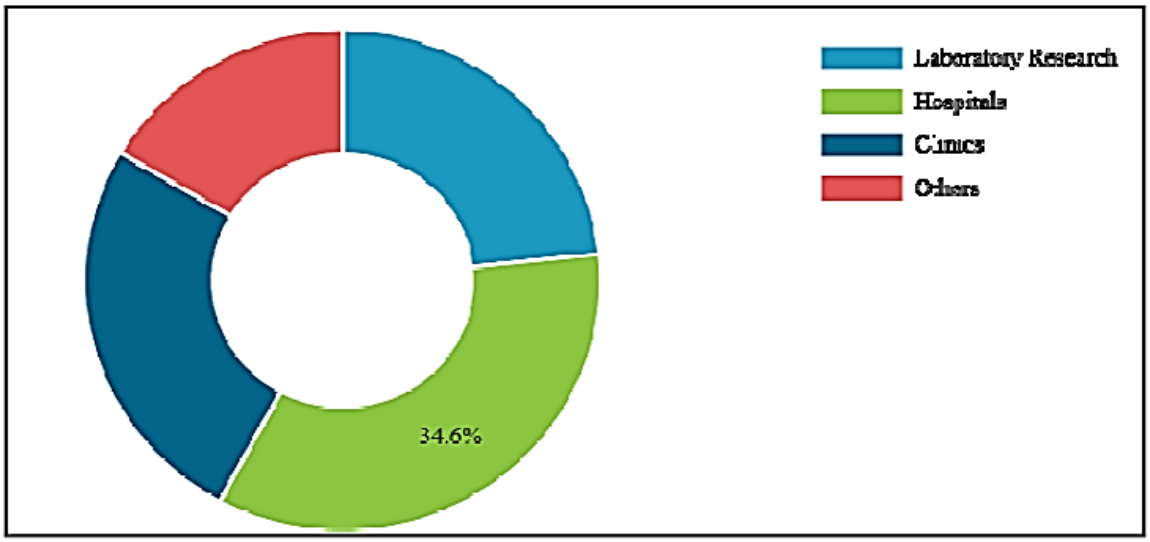

Fig. 2 Global share of IoT market in healthiness care

The "IoT in Agriculture Market by Technology, Robotics (Robots, Drones, and Intelligent Equipment), Sensors Types, Equipment, Applications, and Services 2021 - 2026" study appraises IoT products, firms, and services in the agricultural sector. In this report, the sensors (and additional utilizations), goods, explanations, and information analytics for the worldwide and regional markets since 2021 to 2026 are assessed together with the global market as a whole.

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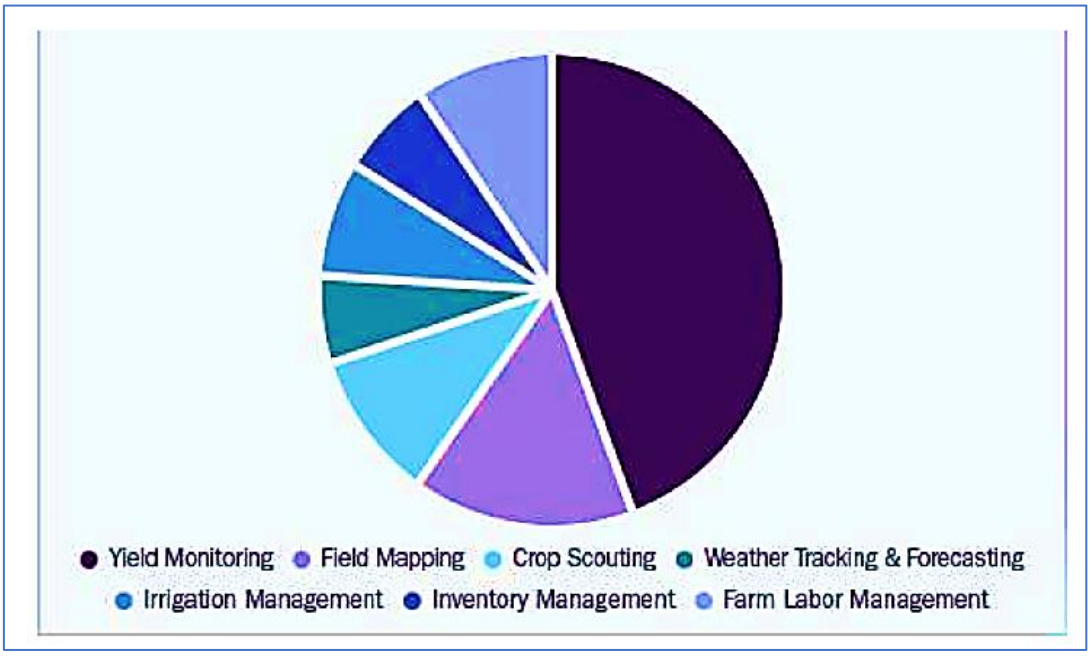

Fig. 3 Global share of IoT market in agriculture

Among the industries predicted to expand are aquaculture, livestock, indoor agriculture, and precision agriculture. By 2026, nursing will be the greatest successful farming-based IoT application, with a global revenue of $7.89 billion. Computerization will upsurge by 63.82.48 billion at a 66.0% CAGR. With a median price of $1,250 per unit, the global market for agricultural drones would reach 1.12 billion by 2026. Intelligent aquaculture initiatives will generate $980 million in revenue globally by 2026, which, in our view, underrepresents the market. The combination of AI and IoT technologies will benefit agriculture greatly in terms of operational effectiveness and efficiency [6]. The worldwide intelligent agriculture market share by intelligent farming submission, 2020 (%), is shown in Figure 3 and is estimated to be about USD 13.15 billion. Figure 3 shows the marketplace share of intelligent farming by request worldwide.

Around Atmel microcontrollers, it is constructed. The Arduino UNO uses an ATmega328P processor as its main CPU. The suggested prototype makes use of the Raspberry Pi. An SBC is the Raspberry Pi (Single Board Computer). Similar to a desktop computer, you may attach a variety of devices, including a screen, mouse, and console through USB, a camera via a specialised Camera Interface, and internet connectivity (through Ethernet or Wi-Fi).

3. Result and Discussion

This prototype analyses a patient's healthiness indicators using pulse instruments and ECG electrodes. During an cardiogram process, an ECG electrode is located to the casing on certain patient body areas, most often the weapons, limbs, and torso. The device can detect electric pulses shaped by the heartbeat. To collect information, a heart-rate sensor known as the Pulse Sensor is placed into the earlobe or fingertip. MEMS technology converts the

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deflections necessary to represent this information into electrical impulses. Micro Electro Mechanical Systems, or MEMS for short, are microscopic mechanical and electrical components that may be manufactured using micro-construction procedures. This is in what way sensor input is generated. Information delivered from a distance is received and stored by the Raspberry Pi. If any of the limits are irregular, the GSM unit is configured to send an SMS to the hospitals telephone and to inform the statistics on the website. The ZigBee protocol is used to communicate. The strategy used in this research is intended for persons who do not have any major medical conditions but yet need frequent monitoring. If a potentially hazardous illness develops, the gadget will notify the doctor. It permits patients to be monitored the least bit from their homes and is both quick and inexpensive. The example model is seen in figure 4 below.

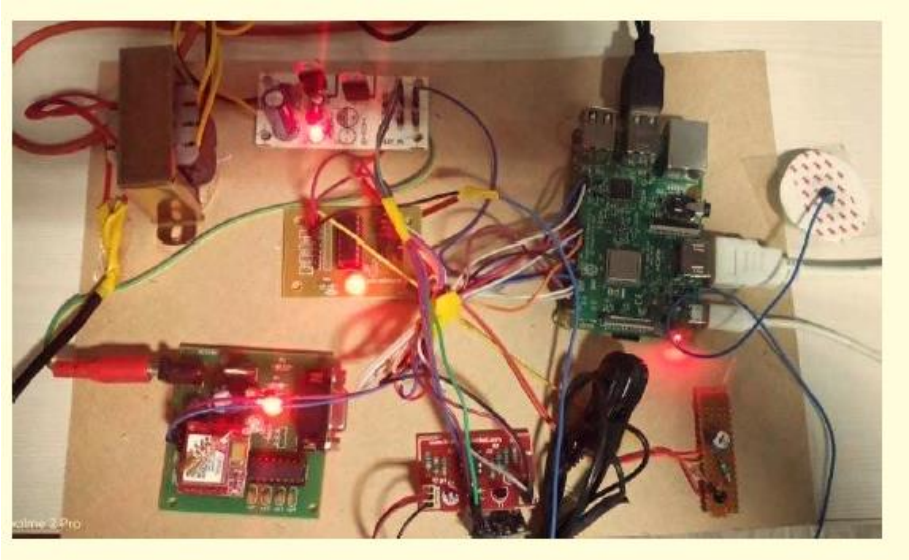

Fig. 4. Prototype of the healthiness care system developed in this research

A prototype with a supervisor, sensors, a GPRS module, and a electrical relay that will power a motor committed to a aquatic reservoir is being created to better understand the application of intelligent irrigation. The Raspberry Pi regulator gathers sensor production information continually, transfers it through Bluetooth to an Internet of Things website, displays it on a monitor, and uploads it via GPRS modem. A motor is employed in this case, and it may be controlled through the internet of things or mobile applications. This engine distributes water from the reservoir as needed by the plant. The model is shown in Figure 5 below.

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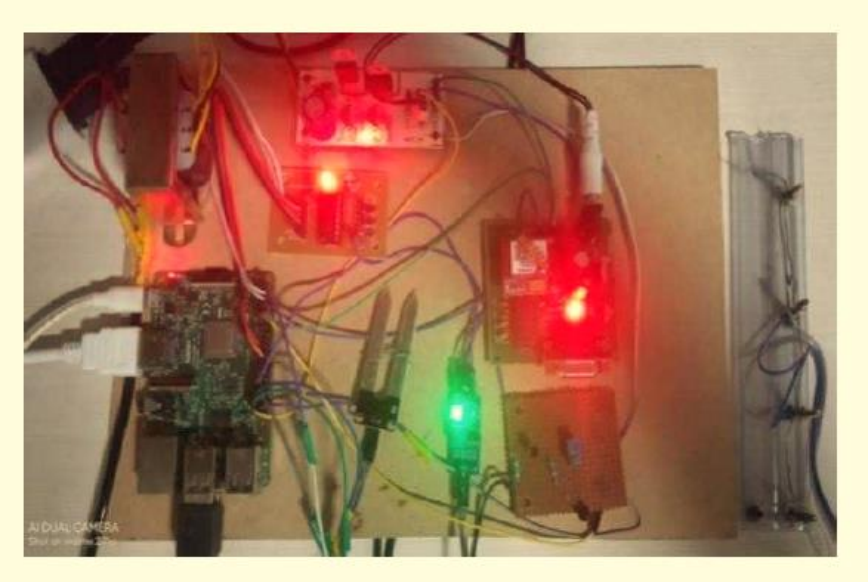

Fig. 5 Prototype of the IoT design developed for intelligent agriculture

Figure 6 depicts how the prototype e-healthiness information collecting system's website may present patient information for both normal and fall states. Once the information has been transferred to the cloud, both the patient and the doctor may examine and analyse it.

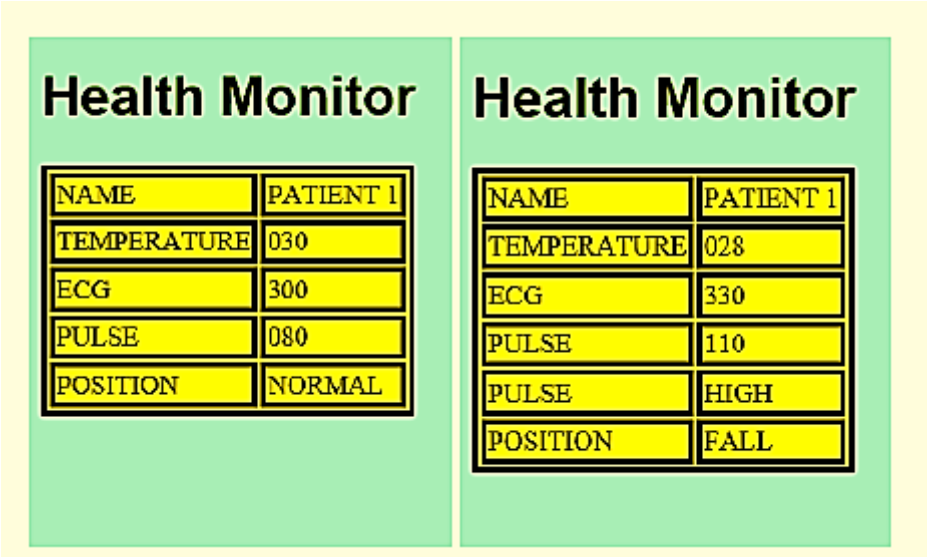

Fig. 6. Patient information in the webpage

Figure 7 shows how transferring all of the patient's information to Google Cloud Services benefits both the patient and the doctor. This will be useful for maintaining medical records. As demonstrated in Figure 7, the LXI command allows you to see the prototype's output on the application desktop.

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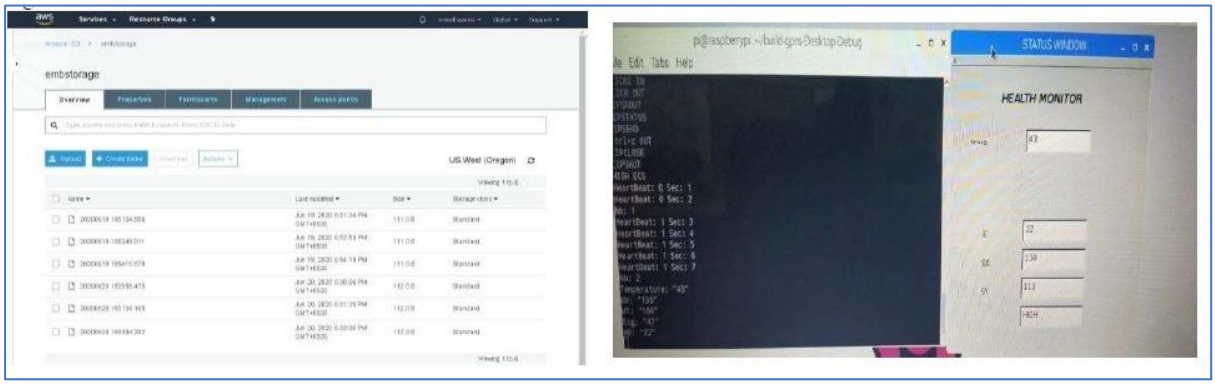

Fig. 7. Patients' information and storage in google cloud

To get the greatest results, the intelligent irrigation example model was tested in a variety of dampness and moisture levels, as well as climate conditions. System testing included the server-to-hardware connection, measurements of soil moisture and temperature, and message between the UI element and the user. Figure 8 depicts the internet and desktop output of the intelligent irrigation prototype, which includes heat monitoring, soil dampness content, soil water position, reservoir water level, and motor ON/OFF position. Furthermore, this information is stored in Google's cloud services for subsequent analysis and forecasting.

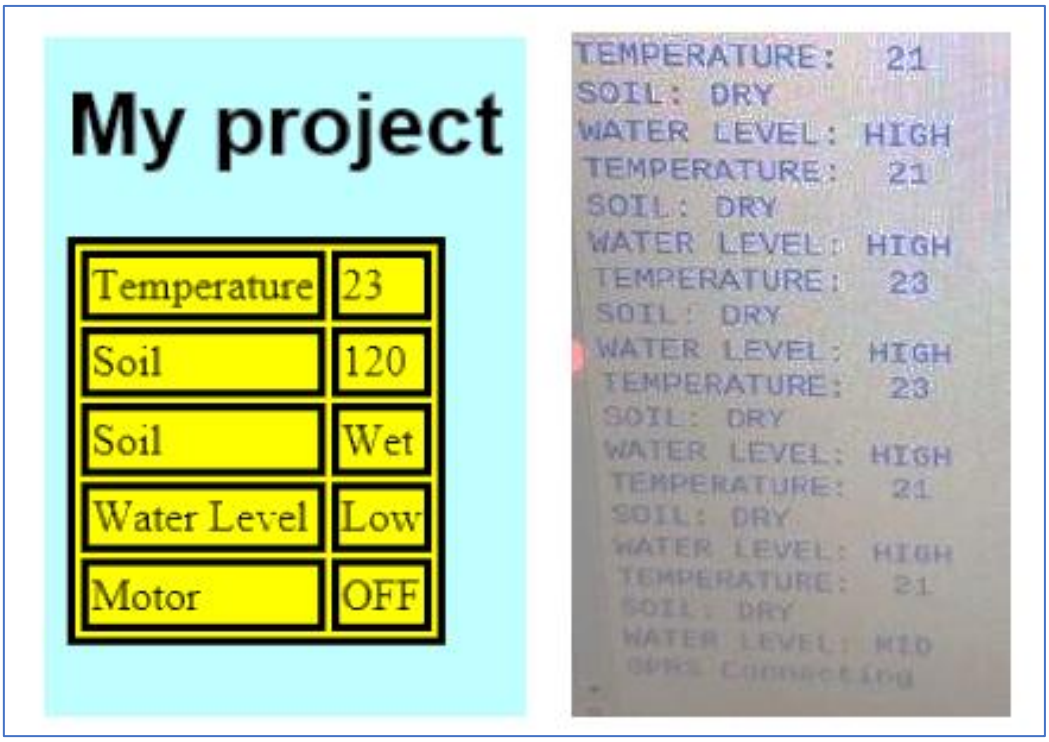

Fig. 8 Farming information and the result displayed in the screen

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CONCLUSION

After doing research and analysis in the associated domains of IoT, communiqué technology, and radiocommunication sensors, it was possible to identify considerable advances during the previous several years. This paper's method tries to integrate these strategies with the enticing qualities of cloud computing. In the instance of intelligent irrigation, the preceding trial shows that employing an automated watering system based on soil moisture saves water use. Before prescribing the optimal course of therapy, the doctor examines the patient's state and sickness using the findings of the E-healthiness information gathering system. In the event of an emergency, a real-time information monitoring system may aid in the execution of critical steps. As a result of numerous experiments with various edge cases and scenarios, it is feasible to accomplish that utilising an IoT platform, present information processing, and monitoring leads to taking suitable actions depending on the circumstance has become simpler. As a consequence, rapid choices may be made with little to no human involvement, saving time, increasing productivity, lowering expenses, and improving performance.

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